



## TELEPHONE INTERPRETATION SYSTEM

### 5 BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

The present invention relates to a telephone interpretation system for providing interpretation services when persons who speak different languages hold a telephone  
10 conversation. In particular, the present invention relates to a telephone interpretation system capable of providing foreigners who speak different languages with public services such as those from administrative institutions, the police, and hospitals without resident interpreters.

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#### 2. Description of the Related Art

Conventionally, when persons who speak different languages hold a telephone conversation, interpretation services are provided by using a three-party telephone call  
20 service. More specifically, the caller calls a company that provides interpretation services, and provides the receptionist with the language and the telephone number of the callee. Then, an interpreter for interpreting the language of the caller and the language of the callee is selected, and the

selected interpreter calls the callee while maintaining the connection with the caller. Consequently, the telephone of the caller and the telephone of the callee are connected via the telephone of the interpreter in a three-party call arrangement, 5 which allows conversation among the three. The interpreter listens to and interprets the speech of the caller into the language of the callee, and listens to and interprets the speech of the callee into the language of the caller, whereby the caller and the callee can have a telephone conversation 10 through the interpreter.

In the conventional telephone interpretation system using such a three-party call, however, the caller or callee who is speaking might be interrupted since he/she hears the voice of the interpreter when the interpreter conducts simultaneous 15 interpretation of the speech of the speaker. The other party might have difficulty in understanding the words since he/she hears the voice of the speaker and the voice of the interpreter which overlap each other. For this reason, in the conventional interpretation services using a three-party call, 20 the interpreter waits for the completion of the speech of the caller before interpretation. The callee waits for the completion of the interpretation before speech. The interpreter then waits for the completion of the speech of the callee before interpretation. Since such a procedure must be 25 repeated, there has been the problem that it is difficult to

provide quick and precise interpretation services.

The same is true for situations where interpretation services are provided by using a telephone conference service. To be more specific, when the telephone conference service is used, the telephone of the caller, the telephone of the callee, and the telephone of the interpreter establish respective connections to a multipoint connection unit. Here, the multipoint connection unit synthesizes the voice of the caller, the voice of the callee, and the voice of the interpreter, and transmits the result to each of the telephones. Thus, the caller or callee who is speaking might be interrupted since he/she hears the voice of the interpreter when the interpreter conducts simultaneous interpretation of the speech of the speaker. The other party might have difficulty in understanding the words since he/she hears the voice of the speaker and the voice of the interpreter which overlap each other.

#### SUMMARY OF THE INVENTION

To overcome the problems described above, preferred embodiments of the present invention provide a telephone interpretation system and a telephone interpretation method that is capable of quick and precise interpretation in which an interpreter or interpreters conduct simultaneous interpretation even while the caller or callee is speaking,

without interrupting the speech of the speaker or hindering the other party from understanding the interpretation.

According to a first preferred embodiment of the present invention, a telephone interpretation system is provided for interpreting a call between a caller and a callee who speak different languages through an interpreter. The telephone interpretation system includes connecting means for connecting a caller terminal, a callee terminal, and an interpreter terminal, and communication means for conducting voice communications among the terminals connected by the connecting means. The communication means includes a first voice transmission function of synthesizing a voice from the callee terminal and a voice from the interpreter terminal and transmitting the resultant to the caller terminal, a second voice transmission function of synthesizing a voice from the caller terminal and the voice from the interpreter terminal and transmitting the resultant to the callee terminal, and a third voice transmission function of synthesizing the voice from the caller terminal and the voice from the callee terminal and transmitting the resultant to the interpreter terminal. The telephone interpretation system further includes an unnecessary side voice suppressing function of suppressing an unnecessary voice, either the voice from the interpreter terminal to be supplied to the first voice transmission function or the voice from the interpreter terminal to be

supplied to the second voice transmission function, by a command from the interpreter terminal. The first voice transmission function includes a callee voice suppressing function of suppressing the voice from the callee terminal  
5 when the voice from the interpreter terminal is detected. The second voice transmission function has a caller voice suppressing function of suppressing the voice from the caller terminal when the voice from the interpreter terminal is detected.

10           According to this preferred embodiment of the present invention, the unnecessary side voice suppressing function suppresses the transmission of the voice of the interpreter to an unnecessary side, either the caller or the callee, by a command from the interpreter terminal. In addition, the  
15 transmission of the voice of the callee to the caller in the original language is suppressed when the voice of the interpreter is detected by the callee voice suppressing function. The transmission of the voice of the caller to the callee in the original language is suppressed when the voice  
20 of the interpreter is detected by the caller voice suppressing function. Consequently, the caller and the callee can understand the details of the interpretation even when the speech of the interpreter overlaps. This makes it possible to provide quick and precise telephone interpretation services.

25           The suppression covers both of the cases where the voice

signal is turned down to some audible level and where it is turned off entirely. The unnecessary side voice suppressing function also applies to a case where the voice of the interpreter is switched and transmitted to either one of the  
5 caller and the callee.

According to a second preferred embodiment of the present invention, a telephone interpretation system is provided for interpreting a call between a caller and a callee who speak different languages through an interpreter. The telephone  
10 interpretation system includes connecting means for connecting a caller terminal, a callee terminal, and an interpreter terminal, and communication means for conducting voice communications among the terminals connected by the connecting means. The communication means includes a first voice  
15 transmission function of switching between a voice from the callee terminal and a voice from the interpreter terminal and transmitting the resultant to the caller terminal, a second voice transmission function of switching a voice from the caller terminal and the voice from the interpreter terminal  
20 and transmitting the resultant to the callee terminal, and a third voice transmission function of synthesizing the voice from the caller terminal and the voice from the callee terminal and transmitting the resultant to the interpreter terminal. The telephone interpretation system further includes  
25 an unnecessary side voice suppressing function of suppressing

an unnecessary voice, either the voice from the interpreter terminal to be supplied to the first voice transmission function or the voice from the interpreter terminal to be supplied to the second voice transmission function, by a  
5 command from the interpreter terminal. The first voice transmission function includes a function of intercepting the voice from the callee terminal and transmitting the voice from the interpreter terminal when the voice from the interpreter terminal is detected. The second voice transmission function  
10 includes a function of intercepting the voice from the caller terminal and transmitting the voice from the interpreter terminal when the voice from the interpreter terminal is detected.

According to this preferred embodiment of the present  
15 invention, the unnecessary side voice suppressing function suppresses the transmission of the voice of the interpreter to an unnecessary side, either the caller or the callee, by a command from the interpreter terminal. In addition, the voice of the callee in the original language is switched to the  
20 voice of the interpreter when the voice of the interpreter is detected by the first voice transmission function. The voice of the caller in the original language is switched to the voice of the interpreter when the voice of the interpreter is detected by the second voice transmission function.

25 Consequently, the caller and the callee can understand the

details of the interpretation even when the speech of the interpreter overlaps. This makes it possible to provide quick and precise telephone interpretation services.

The unnecessary side voice suppressing function also  
5 applies to the situation where the voice of the interpreter is switched and transmitted to either one of the caller and the callee.

According to a third preferred embodiment of the present invention, a telephone interpretation system is provided for  
10 interpreting a call between a caller and a callee who speak different languages through an interpreter. The telephone interpretation system includes connecting means for connecting a caller terminal, a callee terminal, and an interpreter terminal, and communication means for conducting voice  
15 communications among the terminals connected by the connecting means. The communication means includes a first voice transmission function of multiplexing a voice from the callee terminal and a voice from the interpreter terminal and transmitting the resultant to the caller terminal, a second  
20 voice transmission function of multiplexing a voice from the caller terminal and the voice from the interpreter terminal and transmitting the resultant to the callee terminal, and a third voice transmission function of multiplexing the voice from the caller terminal and the voice from the callee  
25 terminal and transmitting the resultant to the interpreter



terminal. The telephone interpretation system further includes an unnecessary side voice suppressing function of suppressing an unnecessary voice, either the voice from the interpreter terminal to be supplied to the first voice transmission function or the voice from the interpreter terminal to be supplied to the second voice transmission function, by a command from the interpreter terminal.

According to this preferred embodiment of the present invention, the unnecessary side voice suppressing function suppresses the transmission of the voice of the interpreter to an unnecessary side, either the caller or the callee, by a command from the interpreter terminal. In addition, the voice of the callee in the original language and the voice of the interpreter are multiplexed and transmitted to the caller by the first voice transmission function. The voice of the caller in the original language and the voice of the interpreter are multiplexed and transmitted to the callee by the second voice transmission function. Consequently, even when the speech of the interpreter overlaps, the caller and the callee can understand the details of the interpretation by selecting and listening to the voice of the interpreter from the voices that are received. This makes it possible to provide quick and precise telephone interpretation services.

The unnecessary side voice suppressing function also applies to the situation where the voice of the interpreter is

switched and transmitted to either one of the caller and the callee.

In the telephone interpretation system according to the first to third preferred embodiments described above, the communication means preferably includes a function of recording the voice from the caller terminal, the voice from the callee terminal, and the voice from the interpreter terminal, and a function of reproducing and transmitting the recorded voices upon request from the terminals.

Consequently, the voices of the caller, the callee, and the interpreter are recorded during interpretation services, and the recorded contents are reviewed upon a request from the terminals. It is therefore possible to review the interpretation at a later time, and to examine the details of the interpretation services later.

For voice recording, the voices to be transmitted to the caller terminal and the voices to be transmitted to the callee terminal may be recorded in a multiplex manner. Consequently, in terminals having a voice demultiplexing function, the language of the caller and the language of the callee can be separated and reviewed for the contents thereof.

Alternatively, the voices to be transmitted to the caller terminal and the voices to be transmitted to the callee terminal may be recorded separately such that the voices of a side designated by a command from the terminals are reproduced

for transmission. Consequently, even in terminals which do not include a voice demultiplexing function, the language of the caller and the language of the callee can be separately reviewed for the contents thereof.

5           In the telephone interpretation system according to the first to third preferred embodiments described above, the connecting means preferably includes an interpreter registration table including at least the language types that the interpreters can interpret and terminal numbers of the  
10 interpreters. The telephone interpretation system includes a function of accepting a call from the caller terminal, a function of acquiring a terminal number of the callee, the language type of the callee, and the language type of the caller from the caller terminal of which the call is accepted,  
15 a function of extracting the terminal number of an interpreter by referencing the interpreter registration table based on the language type of the callee and the language type of the caller acquired, a function of calling the interpreter terminal using the acquired terminal number of the interpreter,  
20 and a function of calling the callee terminal by using the acquired terminal number of the callee.

          Consequently, based on a call from the caller terminal, the terminal number of an interpreter who can interpret between the language of the caller and the language of the  
25 callee is extracted from the interpreter registration table.

Then, the caller terminal, the callee terminal, and the interpreter terminal are connected automatically before voice communications to be interpreted are conducted. Since the caller need not search for an interpreter nor negotiate with the callee in advance, it is possible to provide telephone interpretation services which are suitable emergency responses. In addition, interpreters can provide interpreting services from anywhere as long as they can be called. The time required by the interpreters can thus be minimized to reduce the cost of the interpretation services.

According to a fourth preferred embodiment of the present invention, a telephone interpretation system is provided for interpreting a call between a caller and callee who speak different languages through a first interpreter who interprets the language of the callee into the language of the caller and a second interpreter who interprets the language of the caller into the language of the callee. The telephone interpretation system includes connecting means for connecting a caller terminal, a callee terminal, a first interpreter terminal, and a second interpreter terminal, and communication means for conducting voice communications among the terminals connected by the connecting means. The communication means includes a first voice transmission function of synthesizing a voice from the callee terminal and a voice from the first interpreter terminal and transmitting the result to the caller terminal, a

second voice transmission function of synthesizing a voice from the caller terminal and the voice from the second interpreter terminal and transmitting the result to the callee terminal, a third voice transmission function of transmitting at least the voice from the callee terminal to the first interpreter terminal, and a fourth voice transmission function of transmitting at least the voice from the caller terminal to the second interpreter terminal. The first voice transmission function includes a callee voice suppressing function of suppressing the voice from the callee terminal when the voice from the first interpreter terminal is detected. The second voice transmission function includes a caller voice suppressing function of suppressing the voice from the caller terminal when the voice from the second interpreter terminal is detected.

According to this preferred embodiment of the present invention, the transmission of the voice of the callee in the original language to the caller is suppressed when the voice of the first interpreter is detected by the callee voice suppressing function. The transmission of the voice of the caller in the original language to the callee is suppressed when the voice of the second interpreter is detected by the caller voice suppressing function. Consequently, the caller and the callee can understand the details of the interpretation even when the speeches of the respective

interpreters overlap. This makes it possible to provide quick and precise telephone interpretation services.

The suppression covers both of the situations where the voice signal is turned down to some audible level and where it  
5 is turned off entirely.

According to a fifth preferred embodiment of the present invention, a telephone interpretation system is provided for interpreting a call between a caller and callee who speak different languages through a first interpreter who interprets  
10 the language of the callee into the language of the caller and a second interpreter who interprets the language of the caller into the language of the callee. The telephone interpretation system includes connecting means for connecting a caller terminal, a callee terminal, a first interpreter terminal, and  
15 a second interpreter terminal, and communication means for conducting voice communications among the terminals connected by the connecting means. The communication means includes a first voice transmission function of switching between a voice from the callee terminal and a voice from the first  
20 interpreter terminal and transmitting the resultant to the caller terminal, a second voice transmission function of switching between a voice from the caller terminal and a voice from the second interpreter terminal and transmitting the resultant to the callee terminal, a third voice transmission  
25 function of transmitting at least the voice from the callee

terminal to the first interpreter terminal, and a fourth voice transmission function of transmitting at least the voice from the caller terminal to the second interpreter terminal. The first voice transmission function includes a function of  
5 interrupting the voice from the callee terminal and transmitting the voice from the first interpreter terminal when the voice from the first interpreter terminal is detected. The second voice transmission function includes a function of interrupting the voice from the caller terminal and  
10 transmitting the voice from the second interpreter terminal when the voice from the second interpreter terminal is detected.

According to this preferred embodiment of the present invention, the voice of the callee in the original language is  
15 switched to the voice of the first interpreter when the voice of the first interpreter is detected by the first voice transmission function. The voice of the caller in the original language is switched to the voice of the second interpreter when the voice of the second interpreter is detected by the  
20 second voice transmission function. Consequently, the caller and the callee can understand the details of the interpretation even when the speeches of the respective interpreters overlap. This makes it possible to provide quick and precise telephone interpretation services.

25 According to a sixth preferred embodiment of the present

invention, a telephone interpretation system is provided for interpreting a call between a caller and callee who speak different languages through a first interpreter who interprets the language of the callee into the language of the caller and  
5 a second interpreter who interprets the language of the caller into the language of the callee. The telephone interpretation system includes connecting means for connecting a caller terminal, a callee terminal, a first interpreter terminal, and a second interpreter terminal, and communication means for  
10 conducting voice communications among the terminals connected by the connecting means. The communication means includes a first voice transmission function of multiplexing a voice from the callee terminal and a voice from the first interpreter terminal and transmitting the resultant to the caller terminal,  
15 a second voice transmission function of multiplexing a voice from the caller terminal and a voice from the second interpreter terminal and transmitting the resultant to the callee terminal, a third voice transmission function of transmitting at least the voice from the callee terminal to  
20 the first interpreter terminal, and a fourth voice transmission function of transmitting at least the voice from the caller terminal to the second interpreter terminal.

According to this preferred embodiment of the present invention, the voice of the callee in the original language  
25 and the voice of the first interpreter are multiplexed and



transmitted to the caller by the first voice transmission  
function. The voice of the caller in the original language and  
the voice of the second interpreter are multiplexed and  
transmitted to the callee by the second voice transmission  
5 function. Consequently, even when the speeches of the  
respective interpreters overlap, the caller and the callee can  
understand the details of the interpretation by selecting and  
listening to the voices of the interpreters out of the voices  
received. This makes it possible to provide quick and precise  
10 telephone interpretation services.

In the telephone interpretation system according to  
fourth to sixth preferred embodiments, the communication means  
preferably includes a function of recording the voice from the  
caller terminal, the voice from the callee terminal, the voice  
15 from the first interpreter terminal, and the voice from the  
second interpreter terminal, and a function of reproducing and  
transmitting the recorded voices by request from the terminals.

Consequently, the voices of the caller, the callee, the  
first interpreter, and the second interpreter are recorded  
20 during interpretation services, and the recorded contents can  
be reviewed by request from the terminals. It is therefore  
possible to review the interpretation services at a later time,  
and examine the details of the interpretation services.

For voice recording, the voices to be transmitted to the  
25 caller terminal and the voices to be transmitted to the callee

terminal may be recorded in a multiplex manner. Consequently, in terminals having a voice demultiplexing function, the language of the caller and the language of the callee can be separately reviewed for the contents.

5           Alternatively, the voices to be transmitted to the caller terminal and the voices to be transmitted to the callee terminal may be separately recorded such that the voices of a side designated by a command from the terminals are reproduced for transmission. Consequently, even in terminals which do not  
10 include a voice demultiplexing function, the language of the caller and the language of the callee can be separately reviewed for the contents.

          In the telephone interpretation system according to fourth to sixth preferred embodiments, the connecting means  
15 preferably includes an interpreter registration table including at least the language types that the interpreters can interpret and terminal numbers of the interpreters. The telephone interpretation system preferably further includes a function of accepting a call from the caller terminal, a  
20 function of acquiring a terminal number of the callee, the language type of the callee, and the language type of the caller from the caller terminal of which the call is accepted, a function of extracting the terminal number of the first interpreter by referencing the interpreter registration table  
25 based on the language type of the callee and the language type

of the caller acquired, a function of calling the first interpreter terminal by using the acquired terminal number of the first interpreter, a function of extracting the terminal number of the second interpreter by referencing the  
5 interpreter registration table based on the language type of the caller and the language type of the callee acquired, a function of calling the second interpreter terminal by using the acquired terminal number of the second interpreter, and a function of calling the callee terminal by using the acquired  
10 terminal number of the callee.

Consequently, based on a call from the caller terminal, the terminal numbers of the first interpreter who interprets the language of the callee into the language of the caller and the second interpreter who interprets the language of the  
15 caller into the language of the callee are extracted from the interpreter registration table. Then, the caller terminal, the callee terminal, the first interpreter terminal, and the second interpreter terminal are connected automatically before voice communications to be interpreted are conducted. Since  
20 the caller need not search for interpreters nor negotiate with the callee in advance, it is possible to provide telephone interpretation services suitable for emergency responses. In addition, interpreters can provide interpreting services from anywhere as long as they can be called. The time required by  
25 the interpreters can thus be minimized to reduce the cost of

the interpretation services.

In the telephone interpretation system according to fourth to sixth preferred embodiments, the interpreter registration table preferably includes selection information for selecting interpreters, and the connecting means includes a function of acquiring an interpreter selection condition from the caller terminal, and a function of retrieving the terminal number(s) of an appropriate interpreter(s) by referencing the interpreter registration table based on the interpreter selection condition acquired.

This makes it possible to select an interpreter or interpreters suited to the purpose of the conversation between the caller and the callee, out of those who are registered in the interpreter registration table. The selection information for selecting interpreters includes information on gender, age, residence, fields of specialization, qualifications, and other useful information.

If the interpreter registration table includes the language-specific interpretation levels of the interpreters, users can select interpreters of levels desirable for interpretation between intended languages. Meanwhile, the interpreters can register for a number of different languages that they speak. This provides for flexible, efficient selection of interpreters.

For the telephone interpretation system with

bidirectional simultaneous interpretation, the levels of listening comprehension and those of speaking abilities may be registered separately as the language-specific interpretation levels in the interpreter registration table. This makes it possible to select persons that are the most suitable for the first interpreter and the second interpreter individually, which provides for more flexible efficient selection of interpreters.

In the telephone interpretation system according to fourth to sixth preferred embodiments, the interpreter registration table preferably includes availability flags for indicating whether or not the interpreters are available, and the connecting means includes a function of extracting the terminal number(s) of an available interpreter(s) by referencing the availability flags in the interpreter registration table.

The interpreters can thus register their availabilities into the interpreter registration table such that available interpreters are automatically selected and called. This eliminates needless calls, and provides more flexible efficient telephone interpretation services.

In the telephone interpretation system according to fourth to sixth preferred embodiments, the interpreter registration table preferably includes accounting information on the interpreters, and the connecting means includes a

function of measuring the time for the caller terminal or  
callee terminal to receive interpretation services, and a  
function of calculating fees from the measured time and the  
accounting information registered in the interpreter  
5 registration table.

Since the interpreter registration table includes the  
accounting information on the interpreters, it is possible to  
charge correct fees for the telephone interpretation services.

Here, the interpreter registration table preferably  
10 includes the language-specific interpretation levels of the  
interpreters such that the accounting information is obtained  
by using an accounting table which is provided separately and  
defines the relationship between the interpretation levels and  
hourly rates. Consequently, it is possible to charge correct  
15 fees in accordance with the levels of the interpreters.

Other features, elements, steps, characteristics and  
advantages of the present invention will become more apparent  
from the following detailed description of preferred  
embodiments thereof with reference to the attached drawings.  
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#### BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a system block diagram showing a telephone  
interpretation system according to a first preferred  
embodiment of the present invention;

25 Fig. 2 is a chart showing an example of an interpreter

registration table in the telephone interpretation system according to the first preferred embodiment of the present invention;

Fig. 3 is a process flowchart showing the connection  
5 processing by a control unit in the telephone interpretation system according to the first preferred embodiment of the present invention;

Fig. 4 is a system block diagram showing the telephone interpretation system according to a second preferred  
10 embodiment of the present invention;

Fig. 5 is a chart showing an example of the interpreter registration table in the telephone interpretation system according to the second preferred embodiment of the present invention;

15 Fig. 6 is a process flowchart showing the connection processing by the control unit in the telephone interpretation system according to the second preferred embodiment of the present invention;

Fig. 7 is a block diagram showing a practical example of  
20 a voice communication function in the telephone interpretation system according to the first preferred embodiment of the present invention;

Fig. 8 is a block diagram showing another practical example of the voice communication function in the telephone  
25 interpretation system according to the first preferred

embodiment of the present invention;

Fig. 9 is a block diagram showing a practical example of the voice communication function in the telephone interpretation system according to the second preferred

5 embodiment of the present invention;

Fig. 10 is a block diagram showing another practical example of the voice communication function in the telephone interpretation system according to the second preferred embodiment of the present invention;

10 Fig. 11 is a block diagram showing a practical example of a recording and reproducing function in the telephone interpretation system according to the first preferred embodiment of the present invention; and

Fig. 12 is a block diagram showing a practical example of  
15 the recording and reproducing function in the telephone interpretation system according to the second preferred embodiment of the present invention.

#### DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

20 Fig. 1 is a system block diagram showing a telephone interpretation system according to a preferred embodiment of the present invention. In the diagram, the reference numeral 100 designates the telephone interpretation system which is installed in an interpretation center for providing  
25 interpretation services. The telephone interpretation system



100 connects a telephone terminal 10 to be used by a caller  
(hereinafter, referred to as caller terminal), a telephone  
terminal 20 to be used by a callee (hereinafter, referred to  
as callee terminal), and a telephone terminal 30 to be used by  
5 an interpreter (hereinafter, referred to as interpreter  
terminal) via public telephone lines 40, to provide telephone  
interpretation services by having the interpreter interpret a  
telephone conversation between the caller and the callee by  
telephone.

10       The following description will describe a case in which  
the caller terminal 10, the callee terminal 20, and the  
interpreter terminal 30 are cellular phones with head sets 10d,  
20d, and 30d for inputting and outputting voices plugged into  
respective voice input jacks. It is possible, however, to use  
15 ordinary fixed phones. Voices may also be input and output  
directly by using ordinary handsets.

      The telephone interpretation system 100 includes a caller  
terminal line interface (hereinafter, "interface" will be  
abbreviated as I/F) 120, a callee terminal line I/F 140, and  
20 an interpreter terminal line I/F 160 for establishing  
connection with the caller terminal, the callee terminal, and  
the interpreter terminal, respectively. The line I/Fs are  
connected with voice input and output units 122, 142, and 162  
for inputting and outputting voices to/from the respective  
25 terminals.

The voice input of the caller terminal voice input and output unit 122 is connected with a voice synthesis unit 124 which synthesizes the voice output of the callee terminal voice input and output unit 142, the voice output of the interpreter terminal voice input and output unit 162, and the voice output of a caller terminal voice telop memory 126. The voice input of the callee terminal voice input and output unit 142 is connected with a voice synthesis unit 144 which synthesizes the voice output of the caller terminal voice input and output unit 122, the voice output of the interpreter terminal voice input and output unit 162, and the voice output of a callee terminal voice telop memory 146.

The voice input of the interpreter terminal voice input and output unit 162 is connected with a voice synthesis unit 164 which synthesizes the voice output of the caller terminal voice input and output unit 122, the voice output of the callee terminal voice input and output unit 142, and the voice output of an interpreter terminal voice telop memory 166.

Here, the voice output of the interpreter terminal voice input and output unit 162 is input to a switch 168. A PB detector 169 detects a command from the interpreter terminal. When the interpreter interprets the language of the callee into the language of the caller, the voice output is supplied to the caller terminal voice synthesis unit 124. When the interpreter interprets the language of the caller into the

language of the callee, the voice output is supplied to the callee terminal voice synthesis unit 144. Consequently, the voice of the interpreter is transmitted to either one of the caller and the callee as required. This prevents the speech of the caller or the callee from being interrupted by an unnecessary voice of the interpreter, thereby enabling smooth conversation.

The caller terminal voice synthesis unit 124 includes the function of suppressing the voice level of the callee terminal or switching the voice from the callee terminal to the voice from the interpreter terminal when the voice from the interpreter terminal is detected. The callee terminal voice synthesis unit 144 includes the function of suppressing the voice level of the caller terminal or switching the voice from the caller terminal to the voice from the interpreter terminal when the voice from the interpreter terminal is detected. This prevents the interpreting voice of the interpreter from overlapping with the voice of the other party at the caller terminal or callee terminal, thereby preventing poor audibility. The interpreter can thus conduct simultaneous interpretation of the speeches of the speakers to provide quick and precise interpretation.

Fig. 7 shows a specific example of the function of switching the destination of the interpreter voice in the switch 168 and the functions of suppressing the caller voice

or callee voice in the voice synthesis units 124 and 144. As shown in the diagram, the voice output of the interpreter terminal voice input and output unit 162 is connected to a caller terminal voice signal adder 190 and a callee terminal voice signal adder 193 via the switch 168. The voice of the interpreter is thus supplied to either the caller or the callee depending upon the signal from the PB detector 169. From a data signal or tone signal included in the voice from the interpreter terminal, the PB detector 169 detects that a predetermined caller selection number or callee selection number is pressed on a dial pad of the terminal. The PB detector 169 then switches the switch 168 to the designated side. For this purpose, the interpreter designates which side the interpreting voice is targeted for, the caller or the callee, from the dial pad before he/she speaks. Consequently, the voice of the interpreter will not be transmitted to the caller or callee who does not need to hear the voice of the interpreter.

Now, the caller terminal voice signal adder 190 is also connected with the voice output of the callee terminal voice input and output unit 142 via an attenuator 191. The attenuator 191 attenuates the voice from the callee terminal when the voice of the interpreter is detected by a signal detector 192. The callee terminal voice signal adder 193 is also connected with the voice output of the caller terminal

voice input and output unit 122 via an attenuator 194. The attenuator 194 attenuates the voice from the caller terminal when the voice of the interpreter is detected by a signal detector 195. Here, the signal detectors 192 and 195 are set  
5 to appropriate detection levels so as to prevent the voices of the other parties from accidental attenuation due to noise or other outside sounds.

Incidentally, appropriate signal delay units may be arranged on the interpreter's voice inputs to the voice signal  
10 adders 190 and 193. This ensures that the caller and the callee hear the voice of the interpreter immediately after the voice of the interpreter is detected by the signal detectors 192 and 195.

In the foregoing example, the voices of the other parties  
15 are attenuated by the attenuators 191 and 194 such that the caller or callee hears the live voice of the other party at some audible level while listening to the voice of the interpreter. Nevertheless, the voices of the other parties may be turned off entirely by using switches.

20 Fig. 8 shows a practical example in which the voices of the other parties are turned off and the voice of the interpreter alone is transmitted when the voice of the interpreter is detected. As shown in the diagram, switches 197 and 198 are used instead of the voice signal adders 190 and  
25 193 described above. When the voice of the interpreter is

detected by the signal detectors 192 and 195, the switches 197 and 198 are switched from the voices of the other parties to the voice of the interpreter. In other respects, the configuration is the same as in Fig. 7.

5        Again, appropriate signal delay units may be arranged on the interpreter's voice inputs to the switches 197 and 198 so as to make sure that the caller and the callee hear the voice of the interpreter immediately after the voice of the interpreter is detected by the signal detectors 192 and 195.

10        The foregoing example describes a situation in which the voice signal adders 190 and 193 each simply add the voice of the interpreter and the voice of the other party. Nevertheless, the two signals may be multiplexed. For example, if the terminals are stereo-sound compatible, the voice of the other party and the voice of the interpreter are stereophonically synthesized and transmitted as a left channel and a right channel, respectively. Necessary voices are then selected by the receiving parties on the terminal sides. In this case, the telephone interpretation system need not be provided with the  
15        attenuators for attenuating the voices of the other parties. The receiving parties can adjust the loudness levels of the right and left channels across the headsets separately depending on the circumstances.

20        The foregoing examples describe situations in which the switch 168 is used to switch the destination of the voice of

the interpreter between the caller and the callee.

Nevertheless, the voice of the interpreter may be supplied to both the voice signal adder 190 (or switch 197) and the voice signal adder 193 (or switch 198) through respective

5 attenuators such that the voice signal to the unnecessary party is attenuated by the PB detector 169. When the attenuators are used, the voice of the interpreter is transmitted to the speakers at some level. The speakers can thus speak while checking whether their own voices are being  
10 interpreted.

The telephone interpretation system 100 includes a control unit 110 having an interpreter registration table 112 into which the terminal numbers of interpreter terminals to be used by interpreters are registered. The control unit 110 is  
15 connected with each of the line I/Fs 120, 140, and 160, the voice input and output units 122, 142, and 162, the voice synthesis units 124, 144, and 164, and the telop memories 126, 146, and 166. The control unit 110 provides functions for connecting the caller terminal, the callee terminal, and the  
20 interpreter terminal. The functions include accepting a call from the caller terminal, acquiring the language type of the caller and the language type of the callee, acquiring an interpreter selection condition, extracting the terminal number of the interpreter by referencing the interpreter  
25 registration table 112 based on the language types and the

selection condition acquired, calling the interpreter terminal by using the terminal number extracted, acquiring the terminal number of the callee, and calling the callee terminal by using the terminal number acquired.

5           The inputs of the voice synthesis units 124, 144, and 164 are connected to the caller terminal voice telop memory 126, the callee terminal voice telop memory 146, and the interpreter terminal voice telop memory 166, respectively. The contents of the voice telop memories 126, 146, and 166 can be  
10 set by the control unit 110. Consequently, when holding a telephone conversation through an interpreter, it is possible to transmit necessary voice messages to the individual terminals and establish a three-party call by setting the voice telop memories 126, 146, and 166 with messages for the  
15 respective terminals, and issuing commands to select the signals of the voice telop memories 126, 146, and 166 to the respective voice synthesis units 124, 144, and 164.

Next, description will be given of the connection processing by the control unit 110 for holding a telephone  
20 conversation through an interpreter.

Prior to the processing, interpreter selection information and the terminal numbers of the terminals to be used by respective interpreters are registered in the interpreter registration table 112 of the control unit 110  
25 from an appropriate terminal (not shown). Fig. 2 shows



examples of entry items to be registered into the interpreter registration table 112. The interpreter selection information is information for selecting interpreters that are desired by users, and includes such entries as gender, age, language capabilities, residence, and the fields of specialization. For language capabilities, the language-specific levels of the interpreters are registered such that the users can select interpreters of desired levels in both intended languages. Here, the advanced, intermediate, and primary levels of interpretation are expressed as 1, 2, and 3, respectively. The entries on the residence are made on the assumption that some users may desire persons who have geographic knowledge on certain areas. Zip code is used here for area specification. The entries regarding the fields of specialization are made on the assumption that some users may desire persons who have specialized knowledge on a field or are well informed in topics of the field when the conversation will deal with the field of specialization. Here, the specialized fields of the interpreters may be registered in such subsections as politics, law, business, education, science and technology, medical, linguistics, sports, and hobbies. Since the fields of specialization range widely, hierarchical entries may be made in advance such that the entries are searched in levels desired by users at the time of selection.

Alternatively, qualifications possessed by the individual

interpreters may be registered such that interpreters who carry qualifications desired by the users can be selected.

For the terminal numbers, the telephone numbers of the terminals are registered since the target terminals are  
5 telephone terminals to be connected to public telephone lines.

The interpreter registration table 112 also includes availability flags for indicating whether the corresponding interpreters are available or not. Registered interpreters call the interpretation center from their own terminals and  
10 input commands from their dial pads to set or reset their availability flags. Consequently, the registered interpreters avoid unnecessary calls by setting their availability flags in the interpreter registration table only when they are available. With the availability flags, the users can also  
15 select available interpreters quickly.

Fig. 3 shows the process flow chart of the connection process by the control unit 110. The telephone interpretation system 100 accepts an order for interpretation services when the caller calls the telephone number of the caller terminal  
20 line I/F. The telephone interpretation system 100 then calls an interpreter terminal and a callee terminal, and establishes connection for the telephone interpretation services.

As shown in the flow chart, the presence of a call to the caller terminal line I/F 120 is detected (S100). When a call  
25 is detected, a message requesting an input of the language

type of the caller is output to the caller terminal (S102).

This is performed by providing the caller voice telop memory 126 with voice messages such as "If you speak Japanese, please press 1#" (in Japanese), "If you speak English, please press 2#", ... . Subsequent messages to the caller terminal and the interpreter terminal will be provided in the selected language type of the caller. The language type of the caller, input by the caller is thus acquired (S104).

Next, a message requesting an input of the language type of the callee is output to the caller terminal (S106). For example, if the caller is Japanese, the message is output by providing the callee voice telop memory 126 with voice messages such as "If the language of the callee is English, press 1#. If German, press 2#. ..." (in Japanese). The language type of the callee input by the caller is thus acquired (S108). As a result, messages to the callee terminal will be provided in the acquired language type of the callee.

Now, a message requesting an input of an interpreter selection condition is output to the caller terminal (S110). This is performed by providing the caller voice telop memory 126 with voice messages such as "If a male interpreter is desired, press 1#. If female, press 2#. If you do not care, press 0#", "If an interpreter under the age of 20 is desired, press 1#. For 20 to 39, press 2#. For 40 and above, 3#. If you do not care, press 0#", "If any area specification is

desired, press zip code and #. If not, press 0#", "To specify the fields of specialization, press 1 for politics, 2 for law, 3 for business, 4 for education, 5 for science and technology, ... . Press # in conclusion", and "To specify interpretation level, press 1# for advanced, 2# for intermediate, and 3# for primary. If you do not care, press 0#". The interpreter selection condition input by the caller is thus acquired (S112).

Next, the interpreter registration table 112 is referenced to select an interpreter who has the specified interpretation level in the language of the caller and the language of the callee, matches with the acquired selection condition including gender, age, residence, and/or the fields of specialization, and has his/her availability flag set (S114). Here, registration information on the selected interpreter may be provided via a voice message such that the caller makes a final selection of an interpreter. In addition, the hourly rate (to be described later) of the interpreter, registered in the interpreter registration table 112, may be provided via a voice message. This enables the users to select appropriate interpreters in view of the fees required for the interpretation services.

Next, the terminal number of the selected interpreter is extracted from the interpreter registration table 112 and called (S116). Here, the interpreter terminal may be notified

of personal information about the caller, the language types of the caller and callee, the interpreter selection condition, and other information using the interpreter terminal voice telop memory 166. Whether or not to accept the request for interpretation can be performed in this manner. For example, the personal information about the caller may be member information registered in advance, provided that the interpretation services are offered on a membership basis. When the interpreter terminal accepts the call (S118), a message requesting an input of the terminal number of the callee is output to the caller terminal (S120). This is performed by providing the caller voice telop memory 126 with a voice message such as "Press the telephone number of the callee and #". The terminal number of the callee that is input by the caller is thus acquired and called (S122). Here, the callee terminal may also be notified of the personal information of the caller, the language types of the caller and callee, the interpreter selection condition, and other information by using the callee terminal voice telop memory 146. Whether or not to accept the call, and the presence or absence of errors in the selection condition can be checked in this manner.

When the callee terminal has accepted the call (S124), the telephone interpretation services are started (S126).

If the selected interpreter terminal does not accept the

call in S118, whether a next candidate is available is determined (S128). If a next candidate is available, the processing returns to S114 and is repeated. Otherwise, the caller terminal is notified that there is no next candidate, and the call is released (S130). If the callee terminal does not accept the call in S124, the caller terminal and the interpreter terminal are notified and the calls are released (S134).

The control unit 110 includes a timer (not shown) for calculating the fee for the interpretation services. The timer measures the time from the beginning of a connection to the disconnection. The interpreter registration table 112 includes entries about the hourly rates of the interpreters (not shown). At the end of interpretation services, the fee is calculated based on the time measured by the timer and the hourly rates registered in the interpreter registration table 113. The calculated fee is registered in an accounting database 114, and charged to the user at a later time.

The hourly rates of the interpreters may be determined from the interpretation levels registered in the interpreter registration table 112, by referencing a separately provided accounting table. Here, the accounting table defines the relationship between the interpretation levels of the interpreters and the associated hourly rates.

The foregoing preferred embodiment describes a

configuration in which the interpreter terminal selected does not accept the call, and an appropriate message is simply posted to the caller before disconnection. Alternatively, an interpretation reservation table for registering the terminal  
5 number of the caller and the terminal number of the callee may be provided such that the caller and the callee are notified start of the telephone interpretation service when the selected interpreter accepts the call.

The foregoing preferred embodiment describes a  
10 configuration in which the caller enters the language type of the caller and the language type of the callee for selecting an interpreter. However, the language type of the caller or callee may be acquired automatically by providing the interpretation center with telephone numbers for respective  
15 caller languages or respective combinations of caller languages and callee languages. The foregoing preferred embodiment describes a situation in which the caller enters the interpreter selection condition for selecting an interpreter. However, whether or not to specify the  
20 interpreter selection condition may be inquired first. If no specific interpreter selection condition is required, an interpreter may be selected based on the entered language types alone.

Moreover, in emergency situations, an interpreter in  
25 charge of emergency response may be called automatically when

the caller presses a certain dial numbers.

The foregoing preferred embodiment has describes a configuration in which the telephone interpretation system 100 is defined by the line I/Fs, the voice input and output units, 5 the voice synthesis units and the control unit. However, these components are not necessarily configured as separate pieces of hardware. The functions of the units may be achieved by software processing using a computer.

The foregoing preferred embodiment describes a 10 configuration in which the interpreter terminal 30 is located outside the interpretation center as the caller terminal 10 and the callee terminal 20 are, and provides interpretation services when called from the interpretation center via the public telephone lines. However, the present invention is not 15 limited thereto. It is understood that some or all of interpreter terminals may be installed in the interpretation center such that interpretation services are provided from the interpretation center.

In the foregoing preferred embodiment, the interpreters 20 can participate in interpretation services from anywhere as long as they have terminals capable of connecting to public telephone lines. The interpreters can thus make effective use of their free time to provide interpretation services by using the availability flags mentioned above. This enables efficient 25 and stable operation of interpretation services which often



have difficulty in securing necessary personnel.

The foregoing preferred embodiment describes a configuration in which an interpreter is in charge of both interpreting the language of the caller into the language of the callee and interpreting the language of the callee into the language of the caller. However, a first interpreter for interpreting the language of the callee into the language of the caller and a second interpreter for interpreting the language of the caller into the language of the callee may be selected individually to perform bidirectional simultaneous interpretation.

Fig. 4 shows an example of the system configuration of the telephone interpretation system according to a second preferred embodiment of the present invention for providing bidirectional simultaneous interpretation services. In the diagram, the reference numeral 200 designates the telephone interpretation system which is installed in an interpretation center for providing bidirectional simultaneous interpretation services. The telephone interpretation system 200 connects a telephone terminal 10 to be used by a caller (hereinafter, referred to as caller terminal), a telephone terminal 20 to be used by a callee (hereinafter, referred to as callee terminal), a telephone terminal 32 to be used by a first interpreter (hereinafter, referred to as first interpreter terminal), and a telephone terminal 34 to be used by a second interpreter

(hereinafter, referred to as second interpreter terminal)  
through public telephone lines 40. The telephone  
interpretation system 200 provides telephone interpretation  
services in which the first and second interpreters interpret  
5 a telephone conversation between the caller and the callee by  
telephone.

The telephone interpretation system 200 includes a caller  
terminal line I/F 220, a callee terminal line I/F 240, a first  
interpreter terminal line I/F 260, and a second interpreter  
10 line I/F 280. The line I/Fs are connected with voice input and  
output units 222, 242, 262, and 282 for inputting and  
outputting voices to/from the respective terminals.

The voice input of the caller terminal voice input and  
output unit 222 is connected to a voice synthesis unit 224  
15 which synthesizes the voice output of the callee terminal  
voice input and output unit 242, the voice output of the first  
interpreter terminal voice input and output unit 262, and the  
voice output of a caller terminal voice telop memory 226. The  
voice input of the callee terminal voice input and output unit  
20 242 is connected with a voice synthesis unit 244 which  
synthesizes the voice output of the caller terminal voice  
input and output unit 222, the voice output of the second  
interpreter terminal voice input and output unit 282, and the  
voice output of a callee terminal voice telop memory 246.

25 The voice input of the first interpreter terminal voice

input and output unit 262 is connected to a voice synthesis unit 264 which synthesizes the voice output of the callee terminal voice input and output unit 242 and the voice output of a first interpreter terminal voice telop memory 266. The voice input of the second interpreter terminal voice input and output unit 282 is connected to a voice synthesis unit 284 which synthesizes the voice output of the caller terminal voice input and output unit 222 and the voice output of a second interpreter terminal voice telop memory 286.

Consequently, the voice of the first interpreter is transmitted only to the caller, and the voice of the second interpreter is transmitted only to the callee. This prevents the speech of the caller from being interrupted by the voice of the second interpreter and the speech of the callee from being interrupted by the voice of the first interpreter, thereby enabling smooth conversation.

The caller terminal voice synthesis unit 224 suppresses the loudness level of the voice from the callee terminal when the voice from the first interpreter terminal is detected. The callee terminal voice synthesis unit 244 suppresses the loudness level of the voice from the caller terminal when the voice from the second interpreter terminal is detected. This prevents the voices of the first and second interpreters from overlapping with the voices of the other parties in the caller terminal and the callee terminal, respectively, thereby

preventing poor audibility. The first and second interpreters can thus interpret the speeches of the speakers simultaneously to provide quick and precise interpretations.

Fig. 9 shows a specific example of the suppression of the  
5 callee voice or caller voice in the voice synthesis units 224 and 244. As shown in the diagram, the voice output of the first interpreter terminal voice input and output unit 262 is connected to a caller terminal voice signal adder 290. The voice output of the second interpreter terminal voice input  
10 and output unit 282 is connected to a callee terminal voice signal adder 293. This precludes the caller and the callee from receiving unnecessary voices of the second interpreter and the first interpreter, respectively.

The caller terminal voice signal adder 290 is also  
15 connected to the voice output of the callee terminal voice input and output unit 242 via an attenuator 291. The attenuator 291 attenuates the voice from the callee terminal when the voice of the first interpreter is detected by a signal detector 292. The callee terminal voice signal adder  
20 293 is also connected to the voice output of the caller terminal voice input and output unit 222 via an attenuator 294. The attenuator 294 attenuates the voice from the caller terminal when the voice of the second interpreter is detected by a signal detector 295. Here, the signal detectors 292 and  
25 295 are set to appropriate detection levels so as to prevent

the voices of the other parties from accidental attenuation due to noise or other external sounds.

Appropriate signal delay units are preferably arranged on the interpreters' voice inputs to the voice signal adders 290  
5 and 292. This ensures that the caller and callee hear the voices of the interpreters immediately after the voices of the interpreters are detected by the signal detectors 293 and 295.

In the foregoing example, the voices of the other parties are attenuated by the attenuators 291 and 294 such that the  
10 caller or callee hears the live voice of the other party at a reduced audible level when listening to the voice of the first or second interpreter. However, the voices of the other parties may be turned off entirely by switches.

Fig. 10 shows a practical example in which the voices of  
15 the other parties are turned off and the voices of the interpreters alone are transmitted when the voices of the interpreters are detected. As shown in the diagram, switches 296 and 297 are used instead of the voice signal adders 290 and 293 described above. When the voices of the interpreters  
20 are detected by the signal detectors 292 and 295, the switches 296 and 297 are turned from the voices of the other parties to the voices of the interpreters. In other respects, the configuration is the same as that shown in Fig. 9.

Appropriate signal delay units are preferably arranged on  
25 the interpreters' voice inputs to the switches 296 and 292 so

as to make sure that the caller and callee hear the voices of the interpreters immediately after the voices of the interpreters are detected by the signal detectors 292 and 295.

The foregoing example describes a configuration in which the voice signal adders 290 and 293 each simply add the voice of the interpreter and the voice of the other party. However, the two signals may be multiplexed. For example, if the terminals are stereo-sound compatible, the voice of the other party and the voice of the interpreter are stereophonically synthesized and transmitted as the left channel and the right channel, respectively. Necessary voices are then selected by the receiving parties on the terminal sides. In this case, the telephone interpretation system need not be provided with the attenuators for attenuating the voices of the other parties. The receiving parties can adjust the loudness levels of the right and left channels across the headsets separately depending upon the circumstances.

The foregoing preferred embodiment describes a configuration in which the first interpreter only listens to and interprets the voice of the callee, and the second interpreter only listens to and interprets the voice of the caller. However, the voice of the caller and the voice of the second interpreter may be attenuated and added to the voice to be transmitted to the first interpreter, or multiplexed into the same, for transmission. The voice of the callee and the

voice of the first interpreter may be attenuated and added to the voice to be transmitted to the second interpreter, or multiplexed into the same, for transmission. In this case, the interpreters can conduct interpretation while checking the progress of the entire conversation and reactions of the other parties to the interpretation.

The telephone interpretation system 200 includes a control unit 210 having an interpreter registration table 112 into which the terminal numbers of interpreter terminals to be used by interpreters are registered. The control unit 210 is connected to each of the line I/Fs 220, 240, 260, and 280, the voice input and output units 222, 242, 262, and 282, the voice synthesis units 224, 244, 264, and 284, and the telop memories 226, 246, 266, and 286. The control unit 210 provides functions for connecting the caller terminal, the callee terminal, the first interpreter terminal, and the second interpreter terminal. The functions include accepting a call from the caller terminal, acquiring the language type of the caller and the language type of the callee, acquiring an interpreter selection condition, retrieving the terminal numbers of the first and second interpreters by referencing the interpreter registration table 212 based on the language types and the selection condition acquired, calling the first interpreter terminal and the second interpreter terminal using the terminal numbers retrieved, acquiring the terminal number

of the callee from the caller terminal, and calling the callee terminal using the acquired terminal number.

The inputs of the voice synthesis units 224, 244, 264, and 284 are connected to the caller terminal voice telop memory 226, the callee terminal voice telop memory 246, the first interpreter terminal voice telop memory 266, and the second interpreter terminal voice telop memory 286, respectively. The contents of the voice telop memories 226, 246, 266, and 286 are set by the control unit 210. Consequently, when holding a telephone conversation through interpreters, it is possible to output necessary voice messages to the individual terminals and establish a four-party call by providing the voice telop memories 226, 246, 266, and 286 with messages for the respective terminals, and issuing commands to select the signals of the voice telop memories 226, 246, 266, and 286 to the respective voice synthesis units 224, 244, 264, and 284.

Next, description will be given of the connection processing by the control unit 210 for holding a telephone conversation with bidirectional simultaneous interpretation.

Again, the interpreter selection information and the terminal numbers of terminals to be used by the respective interpreters are registered into the interpreter registration table 212 of the control unit 210 from an appropriate terminal (not shown) before the processing. Fig. 5 shows examples of



entry items to be registered into the interpreter registration table 212. As shown in the chart, the entry items to be registered into the interpreter registration table 212 are equivalent to those of the interpreter registration table 112 shown in Fig. 2. For language capabilities, however, the levels of listening comprehension and the levels of speaking abilities are registered separately. Consequently, interpreters who are most suitable for the first interpreter who interprets the language of the callee into the language of the caller and the second interpreter who interprets the language of the caller into the language of the callee are selected individually.

Fig. 6 shows the process flow chart of the connection processing by the control unit 210. The telephone interpretation system 200 accepts an order for interpretation services when the caller calls the telephone number of the caller terminal line I/F. The telephone interpretation system 200 then calls a first interpreter terminal, a second interpreter terminal, and a callee terminal, and establishes connection for bidirectional simultaneous telephone interpretation services.

As shown in the flow chart, the presence of a call to the caller terminal line I/F 220 is detected (S200). When a call is detected, a message requesting an input of the language type of the caller is output to the caller terminal (S202) as

in the first preferred embodiment. The language type of the caller input by the caller is thus acquired (S204). Next, a message requesting an input of the language type of the callee is output to the caller terminal by using the acquired  
5 language type of the caller (S206) as in the first preferred embodiment. The language type of the callee input by the caller is thus acquired (S208). Next, a message requesting an input of an interpreter selection condition is output to the caller terminal (S210) as in the first preferred embodiment.  
10 The interpreter selection condition that is input by the caller is thus acquired (S212).

Next, the interpreter registration table 212 is referenced to select a first interpreter (S214). Here, the first interpreter should have the specified interpretation  
15 levels, or a level of listening comprehension in the language of the callee and a level of speaking ability in the language of the caller, that matches with the acquired selection condition including gender, age, residence, and the fields of specialization, and have his/her availability flag set. The  
20 terminal number of the selected interpreter is extracted and called (S216).

When the first interpreter terminal accepts the call (S218), the interpreter registration table 212 is referenced to select a second interpreter (S220). The second interpreter  
25 should have the specified interpretation levels, or a level of

listening comprehension in the language of the caller and a level of speaking ability in the language of the callee, that matches with the acquired selection condition including gender, age, residence, and the fields of specialization, and have  
5 his/her availability flag set. The terminal number of the selected interpreter is extracted and called (S222). When the second interpreter terminal accepts the call (S224), a message for requesting to input the terminal number of the callee is output to the caller terminal (S226) as in the first preferred  
10 embodiment. The terminal number of the callee that is input by the caller is thus acquired and called (S228).

When the callee terminal accepts the call (S230), the telephone interpretation services with bidirectional simultaneous interpretation are started (S232).

15 If the first interpreter terminal does not accept the call in S118, whether a next candidate is available is determined (S234). If a next candidate is available, the processing returns to S214 and is repeated. Otherwise, the caller terminal is notified of such and the call is released  
20 (S236). If the second interpreter terminal does not accept the call in S224, whether a next candidate is available is determined (S238). If a next candidate is available, the processing returns to S220 and is repeated. Otherwise, the caller terminal and the first interpreter terminal are  
25 notified and the calls are released (S240). If the callee

terminal does not accept in S230, the caller terminal, the first interpreter terminal, and the second interpreter terminal are notified and the calls are released (S242).

For the sake of simplicity, the selection of the first  
5 interpreter (S214) and the selection of the second interpreter (S220) have been described for situations in which the interpreter registration table 212 is referenced to select interpreters who match with the desired conditions. However, as in the first preferred embodiment, the registered  
10 information about the appropriate interpreters may be provided via voice messages such that the caller makes final selections regarding both of the first and second interpreters.

The control unit 210 includes a timer (not shown) for calculating the fee for interpretation services. The timer  
15 measures the time from the beginning of a connection to the disconnection. The interpreter registration table 212 includes entries regarding the hourly rates of the interpreters (not shown). At the end of interpretation services, the fee is calculated from the time measured by the timer and the hourly  
20 rates of the first and second interpreters registered in the interpreter registration table 212. The calculated fee is registered in an accounting database 214, and charged to the user at a later time.

The hourly rates of the interpreters may be determined  
25 from the interpretation levels registered in the interpreter

that is separately provided. Here, the accounting table defines the relationship between the interpretation levels of the interpreters and the hourly rates.

The foregoing preferred embodiment describes a  
5 configuration in which if the selected interpreter terminals do not accept the call, an appropriate message is simply posted to the caller before disconnection. However, an interpretation reservation table for registering the terminal number of the caller and the terminal number of the callee may  
10 be provided such that the caller and the callee are notified start of the telephone interpretation service when both of the selected first and second interpreters accept the call.

The foregoing preferred embodiment describes a configuration in which the telephone interpretation system 200  
15 is defined by the line I/Fs, the voice input and output units, the voice synthesis units and the control unit. However, these components are not necessarily configured as separate pieces of hardware. The functions of the units may be provided in the form of software processing using a computer.

20 The foregoing preferred embodiment describes a configuration in which the first interpreter terminal 32 and the second interpreter terminal 34 are located outside the interpretation center similar to the caller terminal 10 and the callee terminal 20, and provide interpretation services  
25 when called from the interpretation center via the public

when called from the interpretation center via the public telephone lines. However, the present invention is not limited thereto. Some or all of interpreter terminals may be installed in the interpretation center such that interpretation services  
5 are provided from the interpretation center.

In the foregoing preferred embodiment, the interpreters can participate in interpretation services from anywhere as long as they have terminals capable of connecting to public telephone lines. The interpreters can thus make effective use  
10 of their free time to provide interpretation services by using the availability flags mentioned above. This enables efficient and stable operation of interpretation services which often have difficulty in securing necessary personnel.

Finally, description will be given of a recording and  
15 reproducing function for recording voices during telephone interpretation services, and reproducing and transmitting the same by user requests.

Fig. 11 shows a practical example of the recording and reproducing function in the telephone communication system  
20 according to the first preferred embodiment. As shown in the diagram, the voice output of the voice synthesis unit 124 to be transmitted to the caller terminal and the voice output of the voice synthesis unit 144 to be transmitted to the callee terminal are multiplexed as the left channel and the right  
25 channel, respectively, by a voice multiplexing unit 116. The

resultant is transmitted to a voice recording and reproducing unit 118.

During interpretation services, the voice output of the voice multiplexing unit 116 is automatically recorded by the voice recording and reproducing unit 118 based on a command from the control unit 110, and is stored user by user. The voices stored in the voice recording and reproducing unit 118 are reproduced by a command from the control unit 110 when the voice input and output unit 122 or 142 detects that predetermined dial numbers are pressed from the caller terminal or the callee terminal. The reproduced voices are transmitted to each terminal via the voice synthesis unit 124 or 144 of the detected terminal.

Consequently, if the user terminals have a voice demultiplexing function, the voices of the respective terminals during interpretation services may be reviewed in the language of the caller on the left channel and in the language of the callee on the right channel. Users can also reproduce and review the voices stored in the voice recording and reproducing unit 118 at a later time by calling the interpretation center and inputting predetermined access codes from their terminals.

The method of synthesizing the voices to be recorded into the voice recording and reproducing unit is not limited to the method described above. Any type of method may be used as long

as the users can review the details of the interpretation services. Since some user terminals do not have the voice demultiplexing function, the voices to be transmitted to the caller terminal and the voices to be transmitted to the callee terminal may be recorded separately. In this case, either one of the voices designated from a terminal can be reproduced for transmission.

The users may include persons other than those who have received the interpretation services. The voices stored in the voice recording and reproducing unit 118 may also be reproduced and transmitted when access-authorized persons call the interpretation center by using their telephone terminals and input predetermined access codes.

Fig. 12 shows a practical example of the recording and reproducing function in the telephone communication system with bidirectional simultaneous interpretation according to the second preferred embodiment. As shown in the diagram, the voice output of the voice synthesis unit 224 to be transmitted to the caller terminal and the voice output of the voice synthesis unit 244 to be transmitted to the callee terminal are multiplexed as the left channel and the right channel, respectively, by a voice multiplexing unit 216. The resultant is transmitted to a voice recording and reproducing unit 218.

During interpretation services, the voice output of the voice multiplexing unit 216 is automatically recorded by the



voice recording and reproducing unit 218 based on a command from the control unit 210, and is stored user by user. The voices stored in the voice recording and reproducing unit 218 are reproduced by a command from the control unit 210 when the voice input and output unit 222 or 242 detects that predetermined dial numbers are pressed from the caller terminal or the callee terminal. The reproduced voices are transmitted to each terminal via the voice synthesis unit 224 or 244 of the detected terminal.

Consequently, if the user terminals have a voice demultiplexing function, the voices of the respective terminals during interpretation services can be reviewed in the language of the caller on the left channel and in the language of the callee on the right channel. Users can also reproduce and check the voices stored in the voice recording and reproducing unit 218 at a later time by calling the interpretation center and inputting predetermined access codes from their terminals.

The method of synthesizing the voices to be recorded into the voice recording and reproducing unit is not limited to the method described above. Any type of method may be used as long as the users can review the details of the interpretation services. Since some user terminals do not have the voice demultiplexing function, the voices to be transmitted to the caller terminal and the voices to be transmitted to the callee

terminal may be recorded separately. In this case, either one of the voices designated from a terminal can be reproduced for transmission.

The users may include persons other than those who have received the interpretation services. The voices stored in the voice recording and reproducing unit 218 may also be reproduced and transmitted when access-authorized persons call the interpretation center by using their telephone terminals and input predetermined access codes.

The foregoing preferred embodiments describe configurations in which the caller terminal, the callee terminal, and the interpreter terminal(s) use ordinary telephone terminals to be connected to public telephone lines. However, the present invention is not limited thereto. The present invention may also be applied to configurations in which dedicated telephone terminals to be connected to dedicated lines are used, and in which IP (Internet Protocol) type telephone terminals to be connected to Internet lines are used. Even in these cases, similar telephone interpretation systems or similar telephone interpretation methods are enabled to provide the effects and advantages of the present invention.

Moreover, the present invention may be applied to the function of transmitting and receiving voices in interpretation services that use videophone sets having an

image and voice communication function. In this case, the caller and the callee see images of the interpreters, and the interpreters see images of the caller and the callee. This facilitates understanding of the details of the interpretation, which enables quicker and more precise interpretation services.

As described above, according to the telephone interpretation system and the telephone interpretation method of the present invention, the speech of the speaker and the comprehension of the interpretation by the conversation partner are not disturbed even when an interpreter performs simultaneous interpretation, while a caller or a callee is speaking. This provides for quick and precise interpretation.

While the present invention has been described with respect to preferred embodiments, it will be apparent to those skilled in the art that the disclosed invention may be modified in numerous ways and may assume many embodiments other than those specifically set out and described above. Accordingly, it is intended by the appended claims to cover all modifications of the present invention that fall within the true spirit and scope of the invention.